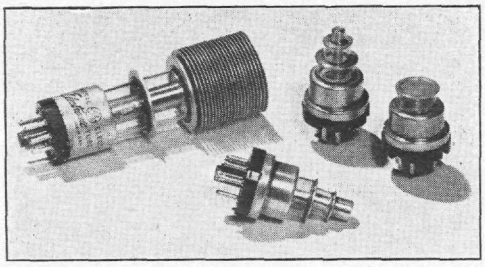
ELECTRONIC HORIZONS

By WILL SUMMERS, EE III

(All cuts courtesy of QST)

With victory almost within the grasp of our armed forces, many manufacturers have begun intensive advertising campaigns to interest the public in their post war products. And since the government has partially lifted the censorship on some secret military devices, almost everyone has some pet theory on just how these devices will affect life in the post war world.

Many of these formerly secret devices are electronic in nature, and it is well to examine the entire field in order to see what we may expect. We must remember that even though it is possible to execute many functions by electronic means, only those which are the most necessary and most



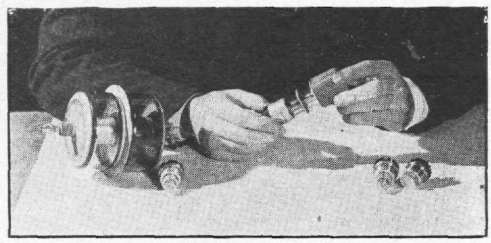
Here is a group of the famous Megatron, Lighthouse, or Disk-Seal tubes by General Electric which have made such functions as ultra high frequency communication and radar possible.

economical will find wide applications. It is quite concievable that many devices will fall into the special category, and others will not be used at all because the end won't justify the means.

A good definition of electronics is the application of devices in which the flow of free electrons is made to perform such numerous functions as the rectification, amplification, generation, and control of electric current. Practically all electronic devices have the following things in common:

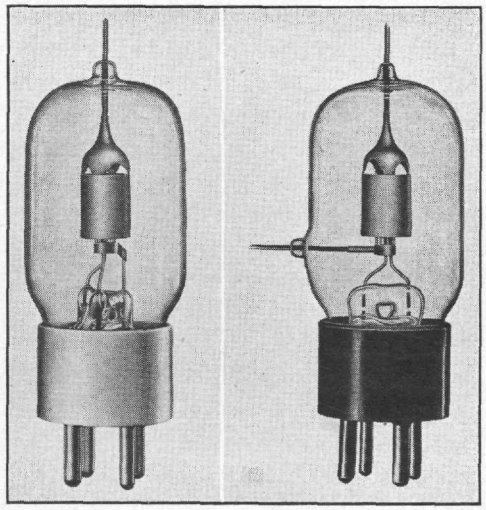
1. They utilize a highly evacuated chamber. However, this space may be filled to a low pressure with inert gas or vapor.
2. They have a negative terminal, known as the cathode, for the source of electrons. This cathode may be a plate, coated with a special material, and relying upon either heat or light for its emission properties. It may also be a pool of mercury.
3. They have a positive terminal, known as the anode, to collect the electrons. Care is exercised to reduce the electron availability of the anode.
4. They frequently utilize one or more additional control elements, usually referred to as "grids", between the cathode and anode.

The operation of a simple three element electronic tube may be explained briefly as follows. A unidirectional current flows from the cathode,

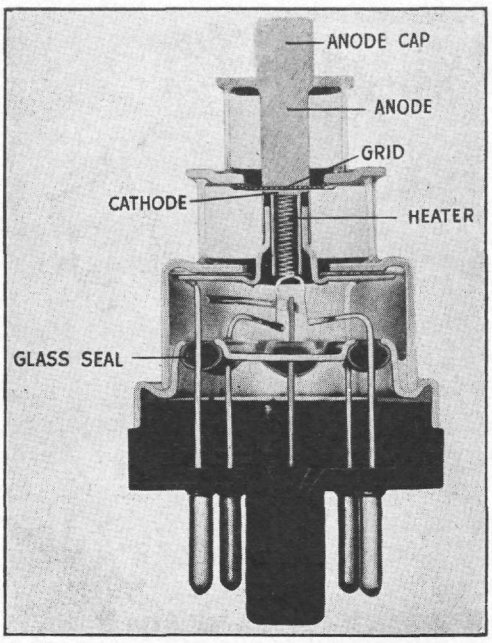


The small size of these Megatrons is illustrated above. Most postwar electronic equipment will be much smaller, more efficient, and more dependable.

which has an excess of electrons, to the anode, which has a scarcity of electrons. However, this current, which is composed of electrons, has to pass through the grid. And since opposite charges attract and like charges repel, the grid, by possessing either a negative or positive charge, can either decrease or increase the current flowing. This fact is put to use, causing minute charge of electricity to control large electrical currents.



Small high frequency tubes such as the 25T and the 3C24 by Eimac will be the heart of postwar communications equipment.



Coplanar construction is the important feature of this Megatron which allows efficiencies never before attained on high frequencies.

Some of the technical advantages peculiar to electronic devices are as follows:

1. They can detect infinitesimally small amounts of power and then accurately amplify them into usable or measurable quantities.
2. They give practically instantaneous response and perfect sentitivity, as compared to the time lag and sensitivity tolerance always present in mechanical contactors having definite mass.
3. They permit application of power without arc.
4. They have no moving or rotating parts. This makes for less wear, as well as easier foundation and mounting problems.

The development of electronics may be best be explained by breaking down the applications into these nine classifications:

Rectification
Inversion
High Frequency Heating
Communications
Measurements
Inspection and Sorting
Precipitation
Radiation
Control

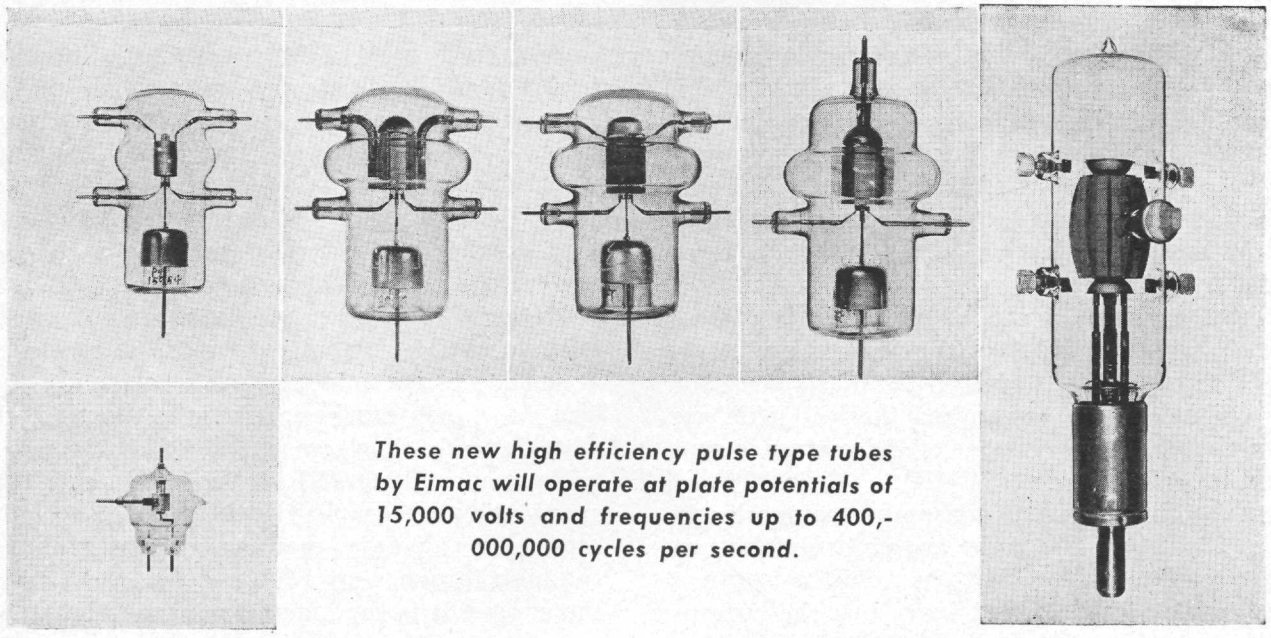
Rectification consists of changing alternating current into direct current. A recent development has been the ignitron, a tube whose output produces a heavy current such as is required for the electrolytic production of magnesium.

Inversion is the process of changing direct current into alternating current. It is possible to control alternating current motor speed by a newly developed inverter.

High frequency heating is the process of using radio frequency power as a source of heat to set plastics, harden metal parts, etc. This process has speeded up manufacturing procedures by hundreds of percent.

Inspection and sorting pertains to the use of photo-electric cells to limit-work. These applications have been known for years, but recent de-

(Please turn to page 26)



These new high efficiency pulse type tubes by Eimac will operate at plate potentials of 15,000 volts and frequencies up to 400,000,000 cycles per second.

ELECTRONIC HORIZONS

(Continued from page 11)

velopments allow tolerances never before attainable.

Communications is the familiar radio-television theme, in which developments will be discussed later.

Precipitation is the depositing of air borne particles by giving the particles charges, which cause them to gather on a charger surface. Home air conditioning units may utilize this principle.

Radiation is the efficient production of radiant energy. Fluorescent lighting is a good example of developments here. Also, ultra-violet sterilizing lamps may soon be common in every home.

Control refers to the use of devices designed to accurately regulate and protect electrical devices. Control devices are very important in industry.

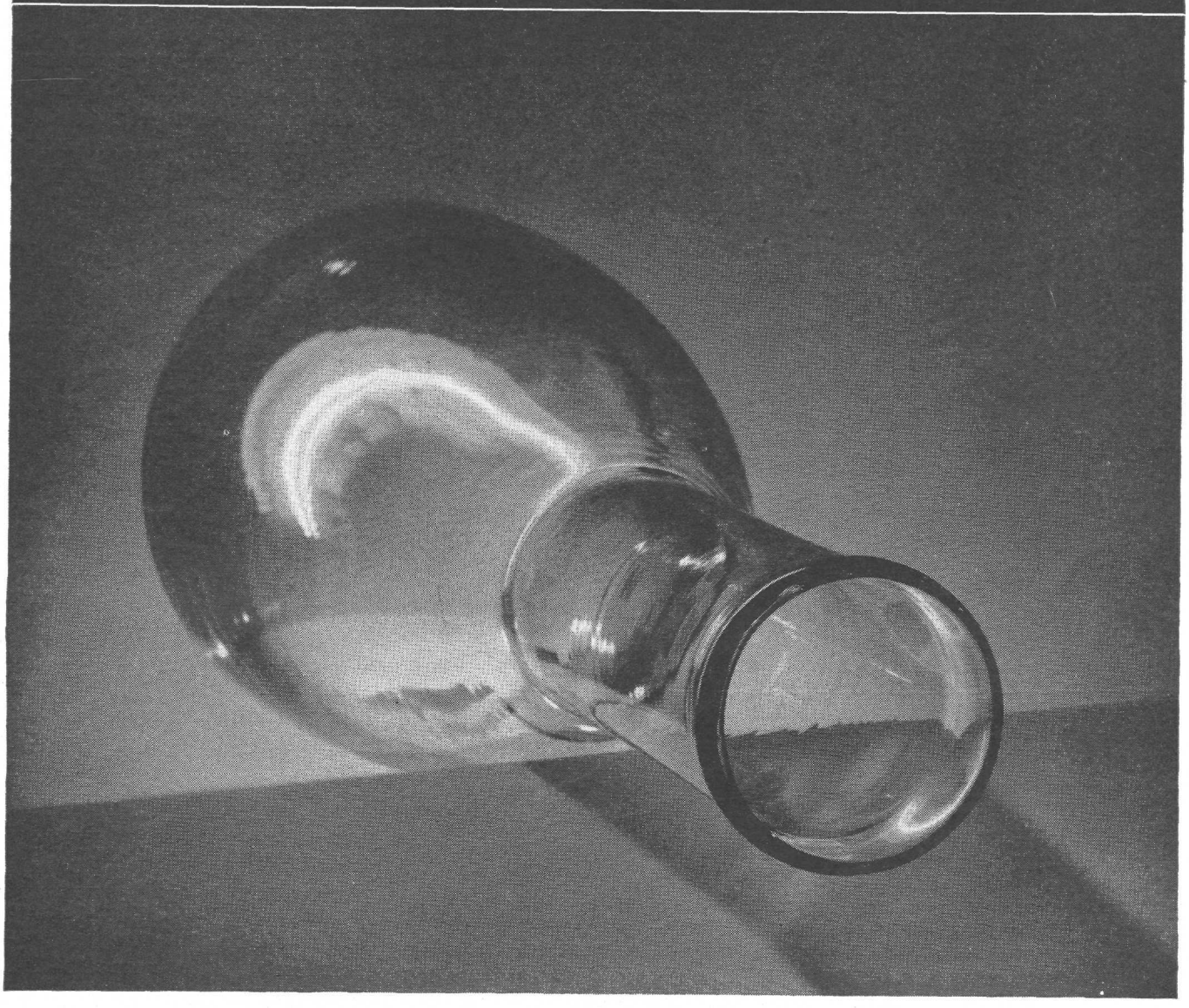
About the only one of these classifications of development which will be encountered by the public as a whole is in the art of communication. These developments in particular will be in the fields of radio broadcasting and television.

In the broadcasting field, several advances have been made in technique. These include frequency modulation, and the so-called pulse-time modulation.

Frequency modulation has

(Please turn to page 28)

How many lives is a glass bulb worth?



NO, it isn't a gun or a new-style bomb. It's just about all we can show you of a special glass radio bulb that is a part of our secret military apparatus.

At one stage in the war a high-ranking officer stated that a bulb of this type was so valuable and effective that he would risk the lives of five soldiers to keep it in operation. That's something to think about. And it's one reason why you find Corning men and women today striving to surpass quality standards that are already exacting.

This bulb is made of a special glass to very strict requirements. And so are most of the articles Corning is making for the Army and Navy and other services. They cover a wide range—from airplane wingtip lights to giant field marking beacon lenses. From laboratory ware for hospitals to optical glass for gunsights. From tough glass messware to thimblesize tubes for field radios.

And these are but a few of hundreds of items that Corning is making for the military services in addition to glassware for industries that supply chemicals and clothing, food, powder, rubber, and gasoline! In these fields and in many others Corning's deep knowledge of glass and glassmaking has made it possible to put this fairly plentiful material to work, not merely as a substitute, but as a new material capable of standing on its own feet and delivering better service in many instances than the one it replaces. Keep this in mind when the peacetime developments you will be working on, reach the blueprint stage—glass is amazingly versatile in the hands of people who know glass. And Corning has spent nearly a century getting acquainted with it. So, when you get to those blueprints, write us. Corning Glass Works, Corning, New York.

CORNING
means
Research in Glass

ELECTRONIC HORIZONS

(Continued from page 26)

been heralded by the set manufacturers as a cure-all for all the disadvantages of present methods of broadcasting. Even though frequency modulation does eliminate static and theoretically provides more natural reproduction, it has the disadvantages of limited range and few stations. Radio engineers are looking to F. M. to supplement, but not supercede regular broadcast.

The pulse-time technique seems to hold great promise for the future. As the frequencies are allocated today, there is quite a bit of crowding and interference, especially in the short wave regions. Pulse-time modulation will allow several programs to be broadcast over the same station at the same time. This will greatly conserve our broadcast frequencies. Also, it is said that it has superior quality, and little noise.

Many engineers seem to think that the trend will be toward higher frequencies. This is because of the crowding on other bands, and also because of the development of new tubes which will operate at frequencies between those formerly attainable and those of light. The new disk-seal, or lighthouse tube and the klystron work at frequencies up to three billion cycles per second, which correspond to a wave length of ten centimeters. Perhaps there are even newer tubes which will economically generate even higher frequencies.

There has been much popular comment about the walkie-talkie radio used by the armed forces. Many people have foreseen the advantages of having such a wireless telephone, but as yet, they are not ready for the public. The main disadvantage is in the fact that so much inter-

(Please turn to page 34)

Keeping America's Pantries well-stocked with wholesome food

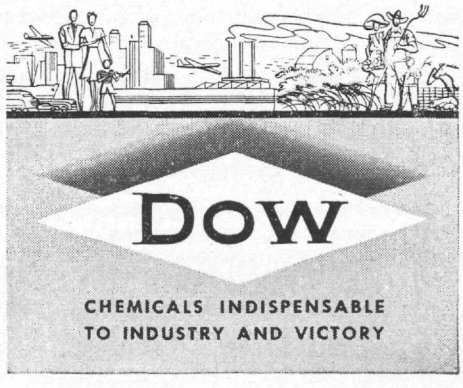
Chemicals protect crops — vital aid in processing and packaging

A well-filled lunch box—a bountiful home table—pantry and refrigerator well stocked with wholesome food—

That's an American custom and millions of people are on the job to see that this custom prevails. Nature provides sun and soil, air and moisture. Man contributes labor. And among his tools none is more essential than chemicals—notably spraying and dusting materials.

Special care must be taken to protect growing crops from destructive pests, and growers rely heavily on Dow insecticides and fungicides. Dow Dormant Sprays, such as *DN*-Dry Mix, and other products such as "Mike" Sulfur, *DN*-111, to control red mite, Bordow, Arsenate of Lead, Calcium Arsenate and Paris Green, have their special jobs to do in orchards, groves, fields and gardens.

Much of this food must be protected from infestations while in storage or en route in cars or ships, as well as in processing and packaging. Great quantities of Methyl Bromide, Chloropicrin, Dow grain fumigant mixtures and other chemical materials are required for such purposes. All these Dow products are produced so that a hungry world can have more and better food.



THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Detroit
Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle

ELECTRONIC HORIZONS

(Continued from page 28)

ference would be caused. It would be a great deal like having all our present telephones connected to one great party line.

However, television seems to be one of the coming applications of electronics which will affect most of the public. It was practical and ready before the war. Now it will be more refined, more efficient, and a better entertainment medium than most of us realize. Sets will be moderately priced, standardized, and capable of long, satisfying performance. The more efficient tubes employed will produce clear pictures, and probably later, full color television.

It may be concluded that while even though the layman will probably encounter many electronic devices in his home, they will be working for him indirectly. Trains, automobiles, airplanes, and even buildings will be safer and more useful. Waste fuel material will be eliminated, and the quality of products will be higher. Production costs will be decreased, and as a whole, there will be an increase in the living standard.

Again, it must be said that electronic devices are not magic lamps. They have limitations, and they must be maintained. However, electronics is going to become synonymous with electricity, for it is the art of making electricity work for us.
